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In touch with the dead : early medieval grave reopenings in the Low Countries

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Citation

Haperen, M. C. van. (2017, May 16). *In touch with the dead : early medieval grave reopenings in the Low Countries*. Retrieved from <https://hdl.handle.net/1887/48880>

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Issue Date: 2017-05-16

2. Methodology

The methodology outlined in this chapter aims at answering the practical research questions formulated in the previous section. The paragraphs below discuss the practical conditions that aid or obstruct the research into reopened graves. The subjects treated include identifying and dating post-depositional interventions, documenting the variability of reopened and intact graves, and assessing the treatment of graves during and after interventions. The strategies examined here serve as a base for the development of the database used in this study, which is discussed at the end of the chapter.

2.1 Identification and prevalence of grave reopenings

The section below deals with various methods for identifying reopened graves and studying the techniques and practices involved in reopenings. For this purpose we will focus on the characteristics of intervention pits, the effect of reopenings on skeletal remains and grave goods, and the potential tools used by the diggers.

Intervention cuts

The traces of intervention cuts (also often called reopening or ‘robber’ pits) are among the most obvious and diagnostic features of reopened graves (Sagí 1964: 360-395; Roth 1978: 65-67; Neugebauer 1991: 113-123, Kümmel 2009: 137-139; Klevnäs 2013: 131-134). Unfortunately, traces of intervention cuts are often not well documented during excavations, and even if they are, they are almost never reproduced in cemetery publications. When a grave was reopened, it could be backfilled with mixed with organic material from the surface. If the intervention pit was left open, it was gradually filled with natural sediment and organic materials from the surrounding area. Both these types of backfilling

can result in a fill that has a different color than the soil around it and is thus recognizable to archaeologists. Reopening pits in early medieval burials usually appear as approximately circular or elongated oval discolorations in the grave’s fill. Care should be taken however, since such features can also be brought about by other mechanisms. After a cemetery was abandoned, pits could have been dug there for reasons unrelated to the graves. For instance, if trees were planted on the site at some point, excavators may observe round circular cuts in the graves that are not unlike reopening pits. Similarly, animal burrows can be mistaken for anthropogenic interventions. Discolorations in the upper part of the grave’s fill can also come about when the wooden container decomposes and fills up with soil that slumps down from above. This slumping can create an indentation in the surface that fills up with darker organic material and sediment. If such discolorations and pits were carefully documented, it should in most cases be possible to distinguish real reopening cuts from other types of features based on their shape, depth and placement in relation to the grave. In addition to color differences between the grave fill and intervention pit, reopenings may also leave traces by cutting part of the grave construction. They may show as protrusions interrupting the outline of the grave pit, or as missing sections in the traces of the wooden container, where the wood remains were broken through or dug away, depending on the container’s state of decomposition.

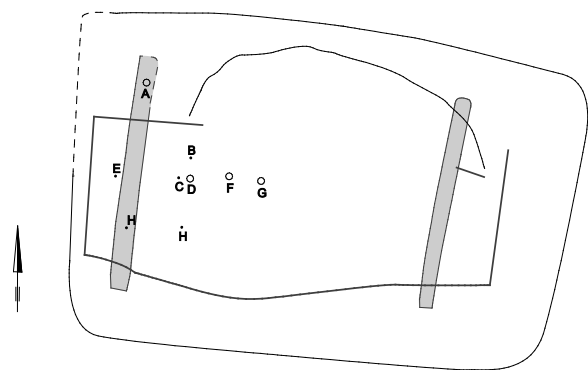


Figure 2.1 Grave 43 from the cemetery of Bergeijk showing interruptions of the coffin outline where it was cut by a reopening pit.

If the excavators did document traces of the reopening cut, additional care should be taken, as such traces do not always accurately reflect the extent of the intervention (Müller 1976: 122; Klevnäs 2013: 46, 53-56). If there was still an open space in the grave because the wooden container had not yet decomposed, the diggers may only have needed to make small hole from which they could access the entire interior of the container (Roth 1978: 65-66; Grünwald 1988: 34; Neugebauer 1991: 115; Aspöck 2011: 303; Klevnäs 2013: 45). In other cases, especially if the wooden container had collapsed or if there was no container to begin with, the diggers may have rummaged the grave's fill, rather than digging a straight edged hole, making it difficult for the excavators to discern the true extent of the cut.

It is often impossible during excavations to recognize any intervention cuts at all, despite careful observation. In some cemeteries, even the grave pits themselves are difficult to see. When the soil is very dark, has been bleached by natural formation processes or has a loose or rough texture with lots of rocks, tracing reopening cuts can be difficult. This is especially the case if the pits were not very clear cut and were backfilled using the original soil that was taken out when the pits were dug. In the Low Countries we are fortunate to usually have relatively well legible soil, but nevertheless it is often not possible to find traces of intervention cuts. In such cases, we have to rely on other indicators that the grave was reopened such as chaotic distributions of skeletal remains and grave goods. It is important to keep in mind that a jumbled grave contents could also be caused by burrowing animals. It can even come about if disarticulated remains which originated elsewhere, for instance from a reopened grave, are brought to a new location and are redeposited (Duday et al. 1990: 43-44).

Skeletal remains

In cases where no traces of a reopening cut were found or documented, displacement or absence of skeletal remains are the prime indi-

cators for post-depositional interventions. However, interpreting the state and layout of the skeleton is not a straightforward affair, particularly for researchers like myself who have had only limited osteological training. The condition and layout of human bone is influenced by a diverse set of factors, of which post-depositional interventions are only one. If bones are missing from the grave, it is difficult to be certain whether skeletal remains were removed, since the preservation of bone material is dependent on numerous taphonomic processes. The condition of bone in the grave may vary considerably between and even within sites. Important factors here are the texture, composition, acidity, moisture and drainage of the soil; variations in grave construction; and of course the nature of the skeletal material itself. Bones will usually decay faster in acidic soils than in soils with a neutral pH. The treatment of the corpse before burial (cremation, embalming, textile wrappings, etc.) and the type of grave construction (sarcophagus, wooden coffin, trench grave, etc.) all affect decomposition and bone preservation (Gordon, Buikstra 1981; Hedges 2002). The fragile bones of children are more likely to disintegrate than the bigger bones of adults. Likewise due to differential preservation, the smaller bones like thoracic vertebrae often degenerate before the more sturdy arm and leg bones (Klevnäs 2013: 131-132). In some cemeteries in the research area, especially those on sandy soils like Bergeijk and Posterholt, almost no skeletal material has been preserved, except for tooth enamel and occasional 'skeletal silhouettes', which are soil discolorations observed around the former location of a skeleton.

Even when the bones are largely intact, it can still be difficult to determine whether they were subjected to post-depositional interventions. An intervention need not necessarily result in bone displacement, especially if the deceased's remains lie in the open space of a wooden or stone container and are barely touched. The degree of displacement may also vary considerably depending on the corpse's stage of decomposition. If an intervention

takes place while the soft tissues in the dead person's body are still largely intact, the remains can be moved without causing disarticulation (Duday et al. 1990: 43; Neugebauer 1991: 115-121; Aspöck 2005: 242; Kümmel 2009: 151-152; Klevnäs 2013: 44-45). As a result, it may be difficult to tell the difference between atypically positioned intact burials, delayed burials where the body had already started to decompose and cases where the deceased's remains were moved during a post-depositional intervention (Aspöck 2011: 315). Persistent joints, such as those in the knees, pelvis and lumbar vertebrae maintain their integrity for months or even years after death, allowing these parts of the corpse to be moved intact when a post-depositional intervention takes place during this period. In such cases it is important to note whether the entire skeleton is articulated, or whether the tendons of unstable joints such as those in the fingers and cervical vertebrae have decomposed, causing these joints to be separated and left in place when the body was moved (Duday et al. 1990: 31). Clothing such as shoes can delay decomposition and even hold together bones after their connecting soft tissues are gone (Klevnäs 2013: 132).

To complicate matters further, if the deceased's bones do appear to have been moved and disarticulated, this need not have occurred during a post-depositional intervention. Disarticulation and displacement of bones can occur under various circumstances, many of which are not caused by anthropogenic action. One of the most prominent natural causes for bone displacement in the grave is so called 'bone tumble', where the bones fall into cavities, mostly in the thoracic and lumbar regions, that open up as the body decomposes. Similarly, bones can also be displaced when organic materials in the grave decompose and collapse. This is especially the case with furnishings like a bed or bier that elevate the deceased's body above the bottom of the grave pit. If the deceased's head is resting on a pillow made of organic material, the skull may roll away from the body when the pillow decomposes. Relatively light elements like the

sacrum, sternum, cranium and vertebrae can even move by floating if groundwater rises in the open space of a coffin (Duday et al. 1990: 32-33, 36; Duday & Guillon 2006: 127-129, 139; Klevnäs 2013: 132; Noterman 2016: 157). Influences from outside, such as ploughing, pits and trenches dug during wars, animal burrowing and tree root activity may also cause bones to move out of place (Klevnäs 2013: 133; Noterman 2016: 159).

Grave goods

In cemeteries where few preserved skeletal remains and visible intervention cuts are found, reopened graves can only be identified on the basis of a chaotic distribution of the grave goods, which unfortunately is a rather unreliable indicator. The notion of an atypical and disorderly distribution of grave goods implies that in an intact grave these objects are usually laid out in a standardized, orderly and patterned way that is easy to recognize. The spatial arrangement of grave goods in Merovingian graves does indeed show a certain amount of patterning (Legoux 2005: 166-167; Theuvs & Van Haperen 2012: 175). In the research area, pottery was frequently deposited near the foot end. Swords and seaxes were positioned left of the deceased's body with the appropriate beld wrapped around it. Belts could also be worn around the waist. Beads are usually found in the thoracic region, worn as necklaces or sewn onto clothing. Brooches were deposited as dress accessories on the deceased's clothing. However, notable exceptions occur: pottery can also be found in other parts of the grave; swords and seaxes are sometimes laid down without a belt or with the belt wrapped around them; and beads can be attached to bracelets, girdle pendants and other objects. Similarly, although grave goods were usually laid down on the floor of the wooden container or grave pit, they could also be deposited on top of the container. This means that objects found in a grave's fill need not signify that a post-depositional intervention took place (Klevnäs 2013: 133).

Nevertheless, by taking into account the overall layout of the finds in a grave, it is often

possible to discern a marked displacement of artefacts and fragments of artefacts. This displacement need not have resulted from a post-depositional intervention, since artefacts can be moved by various processes, which are similar to those discussed above in relation to the movement of skeletal remains. They include falling into the cavities opened in the decomposing body, displacement by collapse of the grave construction, and disturbance by ploughing, animal burrowing or tree root growth (Duday et al. 1990: 32, 36; Klevnäs 2013: 132-133). An alternative way of identifying reopened graves on the basis of artefacts, is to look for evidence that objects were taken from the grave. One of the most well-known forms of such evidence is the bluish green staining on bones that were in contact with copper alloy artefacts (Werner 1953: 7; Sprenger 1999: 43; Neugebauer 1991: 115; Knaut 1993: 30; Kümmel 2009: 143-145, Klevnäs 2013: 134). If the bone material in a grave shows this type of stains while the corresponding object is not found, it is likely that the object was removed from the grave at a later time. However, if there are still copper alloy objects remaining in the grave it is often difficult to know whether they caused the staining or whether it was caused by another object that is now missing. Under certain circumstances small objects may also have dissolved naturally and left no other traces than the green staining (Zintl 2012: 79). Often, graves also contain fragments or components of objects, indicating that the missing fragments may have been taken from the grave during a reopening. Since partial fragmented objects could also have been deposited in the grave during the funeral, such fragments are not hard evidence for a post-depositional intervention (Grünwald 1988: 34; Kümmel 2009: 143; Van Haperen 2010: 18, 2012: 51-53; Zintl 2012: 78). The subject of missing objects shall be discussed further below, in the section about determining what was taken from the grave.

Reopening tools

Another category of finds that may be indicative of grave reopenings are the so-called robber tools. A number of cemetery excavators claim to have found such tools, or traces thereof. The tools fall into two general categories: stick-like probes that were presumably used to locate the grave and explore its contents, and hooks that the diggers used to retrieve objects that were difficult to reach or to avoid touching unsanitary materials (Grünwald 1988: 34; Thiedmann & Schleifring 1992; Knaut 1993: 31; Dannhorn 1994: 301; Leinthal 1995: 131; Dannheimer 1998: 26-29; Stork 2001: 429; Bofinger & Przemyslaw 2008; Kümmel 2009: 135-137; Klevnäs 2013: 12-13). These objects and traces are somewhat problematic since it is often unclear whether they were truly used in grave reopenings or whether they served a different purpose. In my opinion, such objects cannot be used as independent evidence for post-depositional interventions, but should only be used in combination with the other indicators discussed above. It is important to keep in mind the aspect of practicality and ask how the possible tools would have been used, whether they would have been effective and how they could have left the traces attributed to them. A useful starting point for such an investigation is the use of such tools by pre-modern antiquarians and modern grave robbers or amateur archaeologists. Klevnäs cites the antiquarians and early archaeologists Fausset and Brent (Fausset & Smith 1856: 88; Klevnäs 2013: 435-436, 461), who used a metal probe to search for archaeological features, which they could identify because the fill had a looser texture than the surrounding soil. Fausset's probe is described in detail: 'Total length, four feet; from the top to the spur, two feet two inches; from the spur to the point, including the spur, one foot ten inches, spur three inches and a quarter long.' This device apparently consisted of a pointed metal rod, 120 cm long, with a 'spur' mounted halfway so it could be inserted in the ground using foot pressure. Zintl (2012: 66) recounts similar practices among German archaeologists.

I have personally done some research on Dutch internet forums for amateur archaeologists and metal detector hobbyists, and found that some of them use probes that are somewhat similar to the object described by Fausset. The type of probes that were popular in one such forum consisted of a bar made from sturdy metal, such as stainless steel or concrete reinforcement steel (Dutch: *betonijzer*), between one and 60 and 150 cm long. The width of the bar was not often mentioned, but one poster stated that his probe had a diameter of 1 cm. Upon being asked, the same forum member thought that it should also be possible to use a wooden probe with a metal point, providing that the wood was strong and would not absorb water. The probes were not equipped with a spur like Fausset's, but had a T-bar handle at the top and were inserted by arm pressure. As another novelty, the prong was often equipped with a small bulbous protrusion which widened the insertion hole, so the remainder of the bar met with less resistance from the soil and could be moved up or down more easily. According to the forum members the point itself should not be too sharp since one would risk damaging interesting finds. The probes are used both to find spots of loosened soil which are an indicator of previous digging activity and to look for artefacts that do not register on the metal detector (Oorlogsvondsten.nl, the topic on probes (Dutch: *prikstokken*) was consulted on 21-03-2012).

This information on modern probes can be used to set some criteria for identifying similar implements in the early medieval material. It seems safe to state that a functional probe should have a length between 50 and 150 cm; have a handle or spur to push it in; be made of a sturdy material (usually metal, although strong wood with a metal point might also work); and is not exceptionally thin, but not too thick either, since that would make it more difficult to push down. Not all known early medieval 'probes' satisfy these criteria, so it should be questioned whether they could have been used as such. Another question relates to how such sturdy probes were pro-

duced. If they were made of metal, the quality of the workmanship and the amount of iron used would have been comparable to that of a lance, arrow or sword. If so, such probes may have been rather costly tools which the diggers could not have made themselves except if they were trained as smiths. Wooden probes with a metal point would have been less costly and easier to make, but may also have been less effective.

In some cemeteries, the excavators observed long slender cavities in the soil around graves, which are interpreted as impressions left by such probing tools. In the cemeteries of Eussenheim and Remseck-Pattonville, deep narrow shafts were found surrounding several graves. The excavators made plaster casts of them, which showed that they had probably been made by long straight staves (max. 1.5 cm in diameter) that had been inserted into the ground (Leinthal 1995: 131-2; Koch 1996: 737; Bofinger & Przemyslaw 2008: 53). We have to ask whether these traces are the result of early medieval grave reopening activities and if so, how they were preserved for more than a thousand years, and not obliterated by draining water and faunal activity. This would only be possible in exceptionally stiff and stable soil types, where it would have been very difficult to insert a probe at all. It seems likely that if these traces are related to the reopening of the graves, these events probably date to a more recent moment in time rather than the Early Middle Ages. Zintl (2012: 66-77) points out that even if such holes are early medieval, they need not have been related to post-depositional interventions and could instead have served a function during the burial, for instance to loosen up the soil before digging the grave or to facilitate drainage of decomposition fluids from the grave's bottom. In any case, we would not expect to see probing holes in the fill of a reopened grave, since such traces would normally have been obliterated by the reopening. Also, to locate graves for potential reopening, the diggers would not have needed to hammer down their probes deep into the graves' bottoms.

Another frequently mentioned type of grave reopening tools are the hooks that may have been used to search through the grave's contents. The potential use of such instruments is sometimes attested by hook-like artefacts found in the graves or by peculiar displacement patterns of objects and bones which suggest a hook was used to pull them towards the opening of the reopening pit (Grünewald 1988: 34; Dannhorn 1994: 301; Dannheimer 1998: 26-29). The use of a hook required an open space inside a grave's wooden container in which the tool could be inserted and the objects moved around. Such tools could have been made of wood or metal. Once again some skepticism about finds of such artifacts in Merovingian graves is advisable. As Zintl (2012: 71-72) points out the hook-like metal objects shown in some of the literature seem rather small and fragile for the task and may instead have been part of the graves' original furnishings rather than tools left behind by grave reopeners. They could for instance have been remains of folding chair hinges of which the organic components had decomposed. As with the probing tools, such items should not be used as independent evidence for grave reopenings.

Identifying reopened graves

To conclude this section, I will give a short summary of the criteria used in the database to classify graves as reopened or intact. Graves of which the status could not be accurately evaluated are put in the indeterminate category. A small disclaimer is in order here. Great care was taken to assign each grave to the proper category. However as in all archaeological research, ambiguous cases remain, where the grave's status may not have been assessed correctly.

Intact: the traces of the grave construction, the layout of the skeletal remains, and the distribution of the grave goods show no indications that the grave was reopened. Possible observed disturbances are due to natural taphonomic processes or human interference that was not

directed specifically towards the grave (ploughing, tree planting etc.).

Reopened: The excavators noted traces of a reopening pit or a disturbance of the grave construction; there is evidence for dislocation or removal of skeletal elements; and/or if human bone remains are absent, the grave showed a marked atypical, chaotic distribution of artefacts. It is unlikely that the disturbance was caused by natural taphonomic processes or by types of human interference not intentionally directed at the grave.

Indeterminate: It is not possible to determine whether or not the grave was subjected to an intentional post-depositional intervention, or whether any observed disturbances were due to a reopening or were caused by natural taphonomic processes or human interference that was not directed specifically at the grave. This category includes many seemingly 'empty' burials and graves disturbed by animal burrows, ploughing, construction work or tree planting.

2.2. Studying grave reopening practices

This section outlines ways to reconstruct the practices of grave reopening participants. Not all early medieval graves were reopened and the number of intact graves varies considerably between cemeteries. This means that choices were made whether particular graves would be reopened or not. If these choices were not random, it should be possible to discern local and regional patterned differences between reopened and intact graves in chronology, the deceased's gender and age, grave constructions, grave good types, soil type etc. The database allows us to analyze correlations between these variables and discover potential patterns present in the material.

Sex and gender

In this study, sex is defined as the biological sex of the deceased determined by osteological

examination of the skeleton. Gender is defined as the social counterpart of sex, an identity that often seems to have been represented in the funerary ritual by means of the grave goods placed with the deceased. There is a strong correspondence between biological sex and the gender identities expressed in the grave goods. Female skeletons are most often found buried with objects like brooches and strings of beads, which are almost never buried with males. Similarly, male skeletons are frequently accompanied by weaponry, which is only rarely found in the graves of women. Nevertheless, there are notable exceptions. In addition, these patterns may appear stronger than they actually are because osteological analyses are often done with foreknowledge of the grave goods found with the skeleton, which may influence the researcher to score bones buried with weapons as male and those with jewelry as female (Effros 2000; 2006: 212-214). This is problematic, but often cannot be remedied due to the state of research and bad preservation of skeletal remains in certain sections of the research area. Data on biological sex are unavailable for most burials in this study. In such cases, we are forced to rely solely on the deceased's gender identity as it is expressed in the grave goods. We have to assume that graves with weapons usually held the remains of persons gendered as men (regardless of their biological sex) or at least meant to express aspects of male identity. Graves with jewellery are assumed to have contained persons gendered as women, or express aspects of female identity. Graves in which only 'neutral' non-gender specific objects were found, could have contained persons gendered as male, female or one or more additional genders, such as children who had not reached the age where they identified as men or women. In addition to gender and age, many other identities were probably expressed in the burial ritual, which are more difficult for us to reconstruct. It is also important to keep in mind that the identities expressed in the funeral ceremony and grave good assemblage, gender-related or otherwise, need not

have been a direct reflection of the identities held by the deceased during life.

Grave good types

In addition to the differences between the grave good assemblages found in the graves of men and women, there is considerable regional and local variation in both the character and quantity of objects deposited in graves. The broad scope of this study does not allow me to go into the minute details of the typology of early medieval grave goods. The analysis will therefore be based on simple artefact types, such as sword, lance, ceramic pot, glass vessel, bead string, brooch etc. An attempt is made to ascertain which objects were usually taken from or left behind in reopened graves, based on a statistical comparison between reopened and intact burials. Fragmentation of various object types in reopened and intact graves is also assessed.

Grave construction

The construction types of early medieval graves are very diverse (Smal forthcoming). The size of the graves varies between those that can just fit a small child, to graves that are more than four meters long and three meters wide, but nevertheless contain only one body. Most of the deceased in the research area were buried in graves furnished with single or multiple containers of wood or occasionally stone, while others lay in trench graves. Irrespective of the type of container used, the dead may have been wrapped in a textile shroud. The above-ground appearance of the graves may also have varied. For most graves, no traces of surface adornment or marking were preserved. However, this does not necessarily mean that these graves were really not marked in any way. It will be tested whether there are variations in reopening frequency or technique between these types of graves.

The timing of interventions

The chronology of grave reopenings is often difficult to establish. Both the time that passed between the funeral and reopening and the

absolute date at which the reopening took place are relevant for reconstructing the context in which reopenings took place. The time passed between the funeral and reopening yields information about the relation between the diggers and the deceased. The absolute date allows us to place the intervention in a wider socio-historical perspective and compare it to other interventions from the same period. The methods used to date early medieval graves are not unproblematic. Radiocarbon dates and other types of scientific dating methods are still under-used and graves are most often dated on the basis of seriated grave good typologies. Authors such as Siegmund (1998: 204-205) have suggested seriations of grave goods dividing the Merovingian period in tight chronological phases of which some are as short as 25 or even 15 years. Kars (2011: 13-93) has convincingly shown that such short phases are at odds with theoretical views on early medieval inalienable property and artifact circulation. It seems unlikely that early medieval people were indeed so sensitive to fashion that most objects were taken out of circulation within only 15 to 25 years or that the objects deposited in graves were all produced specifically for the funeral and were not used and exchanged in other contexts. Even in modern Western societies valued objects are often kept for much longer periods of time. This study will therefore work with overlapping phases of approximately 50 years, leaving more room for prolonged early medieval exchange and keeping of objects.

Only in rare cases does the evidence allow absolute dating of post-depositional interventions (Kümmel 2009: 148-150; Zintl 2012: 86-87). Reopened graves occasionally contain objects that most likely originated from the diggers, because they date to a later period than the other items found in the grave. Such items can serve as *termini ad* or *post quem* for the intervention (Koch 1991: 215). However, these cases are rare and since it is difficult to assign accurate dates to Merovingian grave goods, such intrusive objects are not easily recognized if the intervention took place during the Merovingian period. In some cases,

reopening pits are cut by other contexts, like other graves or post-holes. If the date of such features is known, they can be used as *termini ad* or *ante quem*, depending on whether the grave appears to have been reopened before or during the construction of the cutting context (Kümmel 2009: 147; Zintl 2012: 88; Klevnäs 2013: 47).

In most cases, post-depositional interventions can only be dated by combining information from multiple indicators. Dating usually relies primarily on estimations of the time that passed between the funeral and reopening. When combined with the dates of the graves, these can provide an absolute time range in which the graves were reopened. One frequently cited indication of the time that passed between the funeral and intervention is the degree of accuracy and precision with which the diggers placed the reopening pit over the grave. Since early medieval cemeteries usually seem to lack permanent grave markers, it is often assumed that the diggers either knew the grave's layout because they had attended the funeral, or could deduce its location from perishable grave markers that did not leave archaeological traces (For instance Stoll 1939: 8; Schneider 1983: 125; Grünwald 1988: 36; Stork 2001: 430; Van Haperen 2010: 10). Klevnäs (2013: 46, 53-56) has criticized this approach for a number of reasons. In cemeteries where the medieval surface level has eroded or has been dug away or disturbed by ploughing, it is no longer possible to make correct estimates of the original extent of the reopening pit. The upper levels which could have contained evidence of search trenches are lost while the lower levels of the cut are always centered on the grave, possibly creating an exaggerated appearance of accuracy. If graves do truly appear to have been opened with foreknowledge, this is still only a vague indication of the timeframe involved. Given the relatively uniform arrangement of early medieval graves, even vague remains of perishable grave markers such as wooden or earthen structures would be sufficient for experienced diggers to reconstruct the grave's layout. Alternatively, the diggers may

have been able to locate the graves' positions using probing tools such as those described above. Therefore, the precision of reopening cuts cannot be used as reliable evidence of the timeframe in which grave reopenings took place. In this context it is also worthwhile to take into account the written sources, specifically the *Lex Salica* title 55, which discussed various types of grave markers, including mounds, honorary columns or posts and wooden huts for the dead, depending on which version of the text is read (Fischer Drew 1991: 118; Schmidt-Wiegand 1994: 257). If these structures were superficial, they need not have left archaeological traces.

More trustworthy estimations of the time that passed between burial and reopening can be based on the state of preservation of the corpse or skeleton and the grave construction (Neugebauer 1991: 115-121; Aspöck 2005: 251, 2011: 303; Kummel 2009: 150-154; Zintl 2012: 88-89; Klevnäs 2013: 43-46). Aspöck has proposed a classification of grave reopenings into four timeframes that can be distinguished based on the state of the wooden container and skeletal remains. The chronological classification shown below that is used in this study's database is based on her work (Aspöck 2005: 242, 251-2, 2011: 302-304). The timeframes listed are estimates, since the rate of decomposition varied depending on local conditions such as moisture level, drainage, texture and pH of the soil and the type of grave construction (Kummel 2009: 152, table 3.36; Zintl 2012: 89; Klevnäs 2013: 44-46).

Timeframe A (within one year after burial): the corpse is still largely intact

When a corpse has only been buried for a short time it is often still largely intact, despite oncoming decomposition. At this stage it can be taken from the grave or moved around inside it without disarticulating. Under normal environmental circumstances where there was no preservation treatment of the corpse and the soil was not exceptionally moist, this stage can last up to one year.

It is only rarely possible to recognize this timeframe in the archaeological material, since an intact articulated skeleton in a reopened

grave could either signify that the corpse was intact during the reopening or that the diggers did not touch or move the bones when they opened a grave containing skeletonized bones. Aspöck (2011: 303, 318-319) has argued that the unusual positions of the 'deviant burials' found in the Anglo-Saxon cemetery of Win-nall II may actually result from manipulation of the corpses during post-depositional interventions. In such cases, it is difficult to be certain that the bodies had not already been laid down like this during the funeral or slipped inside the coffin when they were transported to and lowered down into the grave. This was termed 'coffin slide' by Klevnäs (2013: 132).

Timeframe B (usually within 0-10 years, but may take longer in wet conditions): the corpse is skeletonizing, but still partially articulated

During or shortly after the first year in the grave, the corpse's tendons of unstable joints such as the fingers, toes and cervical vertebrae will start to decompose, while the more persistent joints such as those of the pelvis, lumbar vertebrae and knees will remain intact for months or years after burial (Duday et al. 1990: 31). Even after most of the soft tissues are gone, part of the skeleton may still be held together by sinews, tendons as well as the deceased's clothing. The process of complete skeletonization will usually take up to ten years, but may take longer in exceptionally wet conditions.

According to Aspöck, graves can be assigned to this timeframe that show signs of having been dug open, but show little or no disturbance of the skeleton. Such observations could indicate that the skeleton was still held together by its own tendons or by the clothes it was dressed in. Care is required however, since the diggers could have examined the grave without disturbing the decomposed corpse, especially if they were working in the open space of an intact wooden container (Kummel 2009: 142; Klevnäs 2013: 44-45). In addition, a completely intact body could also be evidence of timeframe A. The displacement of articulated ligaments that were separated from other parts of the body is a more reliable indicator of

reopenings that took place when the body was partially skeletonized (as observed by Neuffer-Müller & Ament 1973: 19; Grünwald 1988: 35; Schneider 1983: 125; Klevnäs 2013: 44-45).

Timeframe C (0-35 years): wooden container is still intact

Depending on their construction and material, most wooden grave containers decompose between 10 and 35 years after burial. Only graves with a wooden container can be assigned to this time frame. There are two methods for determining whether the container was intact at the time when the grave was reopened. In rare cases, the excavators may have documented traces of whole wooden boards that were broken off and moved during the intervention. This would not have been possible after the container had decomposed. However, care is required, since boards could also have been moved when the wooden construction in the grave collapsed as part of the natural decomposition process. Aspöck (2005: 251) herself determines whether the container was intact by looking for evidence of an open space inside the grave at the time of reopening. If the coffin had decomposed and filled with earth by the time the grave was reopened, any disturbed objects would most likely be mixed with the intervention pit's fill. If the displaced grave goods and bones are all found on the grave's floor, it can be assumed there was still and open space inside the container when the grave was reopened. However, it should be noted that this argument does not hold true in reverse. If the objects are found mixed with the fill, this could mean that the open space in the container had filled with earth, but it is equally possible that the objects from an open space were mixed with the fill when it was dug out and deposited near the grave, after which the mixture was used to backfill the intervention pit. The diggers could also have purposely buried objects higher in the fill. In the cemeteries of Deersheim and Eching-Viecht for instance, the fill of some reopening pits had been covered by animal remains and stone

piles (Schneider 1983: 126-127; Dannhorn 1994: 299).

Timeframe D (>35 years): body has skeletonized, the organic grave containers have decomposed and the grave has filled up with earth

It is very difficult to narrow down the timeframe of interventions that occur after the body has skeletonized and the wooden containers have decomposed. Such graves could have been reopened 40 years after burial, but 200 or 1000 years is equally possible. If the body is skeletonized, the individual bones can be moved freely across the grave. A decomposed container can be recognized if the intervention pit cuts through the container outline or the objects and bones are mixed with the pit's fill, indicating that the container had filled up with soil so there was no open space in which the objects could be moved and deposited on the grave's bottom.

In her study of reopened graves from the Kent region, Klevnäs distinguishes a fifth timeframe, when the bone itself had actually started to decay and fragment. According to the author, graves that are reopened during this timeframe can be recognized from the fragmented state of the bones and the distribution of fragments of the same bone over various parts of the grave (Klevnäs 2013: 44). However, since it is possible that the diggers purposely fragmented the bones, even when they had not yet decayed to a fragile state, I prefer not to use bone fragmentation as a criterion for dating post-depositional interventions.

Some authors suggest that the 'disarticulation' of multicomponent artefacts, such as leather belts with metal fittings, can also be used to estimate the time that passed between funeral and reopening, similar to the decomposition of wooden grave containers (Knaut 1993: 32; Zintl 2012: 90; Klevnäs 2013: 46-47). If for example the plates of a belt were scattered throughout the grave, it is likely that the leather had decomposed. If on the other hand such multicomponent artifacts were moved as

a whole, this is an indication that the grave was probably reopened while the organic components were still intact. Like skeletal fragmentation however, this indicator is somewhat problematic since intact artefacts could have been fragmented intentionally, both as part of the funeral ceremony and during reopenings.

Unfortunately, there are many graves that cannot be assigned to any of the time frames above. If burials are not well preserved or well documented, little evidence is available concerning the condition of the corpse and the organic grave containers at the time of the intervention, limiting our ability to estimate when the grave was reopened. It is therefore often not be possible to date interventions in these graves, other than by comparison with dated reopenings of similar appearance. A general indication of when graves were being reopened in a cemetery can also be obtained through the presence of single disarticulated bones in intact graves. Since these bones probably originated from reopened graves, it is likely that other graves in the cemetery or region were being or had been reopened when the new graves were constructed.

2.3 Treatment of the grave during interventions

Grave reopening types

Preliminary analyses of the data showed three main types of contemporary or near-contemporary post-depositional interventions in early medieval graves: *reopenings*, *intercuts* and *additional burials*. We distinguish between *straightforward reopenings* (traditionally called ‘grave robbery’), where a pit was dug into the grave with no other apparent purpose than to gain access to its contents. A more rare subtype is *superficial reopenings*, where the intervention pit accesses only the grave’s upper fill and does not go down to the grave’s bottom where the skeleton and most of the grave goods are. These shallow reopening pits can be confused with the natural slumping of a grave’s fill that occurs when the coffin collaps-

es, nonetheless there seem to be a few cases of genuine superficial reopening. Such superficial reopenings were also found by Zintl in her research area (2012: 337-338).

Another common intervention type is *intercuts* between graves. I distinguish two subtypes. The first is *invasive intercuts* which cut into the section of the affected grave where grave goods and bones lay. The second is *non-invasive intercuts* which cut only the upper layers or peripheral areas of the affected grave and do not access the coffin and the area where the deceased’s bones lay.

The third intervention type is the deposition of *additional burials* in an existing grave. Archaeologists often call these ‘secondary burials’. This term is avoided here to prevent confusion with cultural anthropologists, who use it to designate the reburial of remains that were previously buried elsewhere (for instance Huntington & Metcalf 1978). Unfortunately, it is not always possible to determine whether additional burials took place and whether multiple individuals were deposited in the grave simultaneously in one event or consecutively over a longer period of time. The later addition of new burials can once again be divided into two subtypes: cases where the original burial is pushed aside or removed from the grave and cases where the original burial is left intact. In the dataset there are additional burials in the form of the inhumation of a complete body, the deposition of cremation remains, or the reburial of disarticulated remains that had previously been buried elsewhere.

As we shall see in the data analysis chapter, multiple interventions of various types can be found in a single grave and the relations between them are often complex and difficult to grasp. In a way, a freshly constructed grave is like a stage for future post-depositional interventions and other activities that can continue to tell the story of the deceased and the burial community.

Intentions of the participants

The ways graves were treated when they were reopened are often taken as indications of the

participants' thoughts and intentions. The less than optimal state of preservation and documentation of the evidence does not always facilitate interpretations of this kind. However, even when the material is well preserved and documented, the correct interpretation can still be a point of contention between scholars.

One question that is often asked, is whether the diggers were familiar with the grave's layout. As discussed above, the apparent precision with which most reopening pits seem to be dug may often be an illusion caused by disturbance of the upper soil levels (Klevnäs 2013: 46, 53-56). We should instead look for evidence such as search trenches, that would indicate that the diggers did not know the graves' exact position, and had to look for it (Grünwald 1988: 35; Fischer 1993: 61; Damminger 2002: 7; Kümmel 2009: 138; Klevnäs 2013: 38, 51).

Due to these concerns, it will also be difficult to determine whether the diggers targeted specific sections of the grave. Combining evidence from the traces of intervention cuts and the distribution of skeletal remains and grave goods should allow us to make some headway in this area, but it is important to keep in mind that absence of evidence is not evidence of absence. If part of a grave looks undisturbed, it could nonetheless have been reopened, especially if there was still an open space inside the coffin (Codreanu-Windauer 1997: 29-30; Klevnäs 2013: 46, 53-56). Conversely, disturbances of the skeleton and grave goods are not necessarily related to an intervention, but could have been caused by burrowing animals, ploughing and other taphonomic processes.

When gathering evidence concerning the participants' intentions, it is also worthwhile to check for evidence of the purposeful removal or fragmentation of particular skeletal elements and artefact types. Since human skeletons have a high degree of uniformity, it is relatively easy to determine whether or not bones are partially or entirely missing from the grave. Some difficulties may nonetheless arise due to natural differential preservation of the

material, the state of the documentation and the lack of osteological expertise in many publications. Since grave good assemblages are far less uniform than human skeletons, it is somewhat more complicated to determine what objects were removed from reopened graves. In some cases, parts of fragmented objects are found in reopened graves, suggesting that the remainder of the fragments was taken by the diggers. However, it cannot be excluded that partial fragmented objects were occasionally deposited in the grave during the funeral. According to Ament (1976: 309-310) the breaking of pottery was part of late Merovingian funerary rites. Another method to determine which grave goods were taken, is the comparison of object assemblages from reopened and intact graves (Aspöck 2005: 256-258; Kümmel 2009: 256-259; Zintl 2012: ; Klevnäs 2013: 65-74). This is not straightforward since differences between the assemblages found in reopened and intact graves could be due either to selective removal of certain object types from reopened graves, or selective reopening of graves with particular grave good assemblages. Such comparisons between reopened and intact graves will be discussed in more detail in the section on statistical analysis below.

Treatment of the grave and its contents after the intervention

The question of what happened after a grave was reopened has not often been addressed extensively. A query into this subject should take into account whether graves were usually reopened only once or multiple times, whether the intervention pit was backfilled, what types of objects were left behind in the grave, whether the diggers added any items to the fill and what other activities may have taken place on the cemetery apart from funerals and reopenings.

Early medieval reopened graves could be backfilled after they had been reopened (Stoll 1939: 9; Aspöck 2005: 255, 262; Zintl 2012: 159, 200; Klevnäs 2013: 57-59). The most reliable evidence for backfilling can be found in cross section drawings or photographs of

the intervention pit's fill. If a pit has a homogenous fill, it was probably backfilled. If on the other hand, the fill shows thin layers of sedimentation, the pit probably filled up naturally. Unfortunately such sections are rarely documented in excavations. Objects and bone material found in the fill may also serve as evidence for backfilling of the reopening pit. Neugebauer (1991: 115) has suggested that objects and bones could have rolled into open intervention pits. Consequently, the presence of objects in the fill should not be taken as definitive evidence that the grave was backfilled. However, objects that suffered prolonged exposure to the wind and rain while they lay on the surface in or around a pit, should show significantly more signs of erosion than objects that were buried in a purposely backfilled pit. Where available, information on the state of objects found in the fill may help us to determine whether intervention pits were intentionally backfilled. Another important question is how the items taken from the grave were used after the intervention. To answer this we should look at evidence for reuse of grave goods in other contexts such as deposition of objects or bones in neighboring graves. Examples of this, though not unproblematic, can be found in Werner (1953: 7), Christlein (1966: 17-18), Grünwald (1988: 35), Knaut (1993: 36) and Codreanu-Windauer (1997: 33.). Finds of bone material or typical grave goods in settlements or cult sites may also be of use. In addition, references in the historical sources about the use of materials from graves, for instance as relics or objects with magical potency (Flint 1991: 215-216, 228-231) should be examined. It is important to ask what was the condition of materials that had lain in the grave for a number of years. This will help us understand in what ways the objects could have been used: whole, refurbished, or as a source of raw materials that could be recycled (Grünwald 1988: 40; Codreanu-Windauer 1997: 33; Van Haperen 2010: 22-24). A final issue that should be addressed is the relation between grave reopenings and other consecutive mortuary practices, such as peri-

odical mortuary feasting, intercuts by later graves, additional burials in older graves, the complete emptying and reuse of graves and finally, the abandonment of cemeteries. The database is equipped with fields that record evidence of such activities, allowing us to find possible correlations.

2.4 Research strategy

The research area

The research area of this study covers of the Low Countries, with a focus on the southern Netherlands. This area was chosen mainly for practical reasons, as it has relatively many well documented cemetery excavations of which the data are convenient to access for a researcher working in the Netherlands. I also feel a commitment to this material which for the most part is only available in Dutch. Until recently, the Low Countries were a somewhat neglected region when it came to the study of early medieval cemeteries. This neglect is now slowly being compensated, but active input from new researchers is required. As a Dutch researcher who has access to this material, I want to do my part in filling this gap in the European dataset. Other researchers contributing to the study of reopened graves have focused primarily on England, Germany, Austria, Eastern Europe and Scandinavia. The Netherlands and Belgium are now a blank area on the map, between two regions where grave reopenings have been studied. This study is a first step towards filling in this blank, making the data available to the English reading international audience, who otherwise would not have access to them.

As with all research areas there are advantages and disadvantages to working with material from the Low Countries. A big downside is the poor preservation of skeletal material in the sandy soil types prevalent in many parts of the region. This severely limits the possibilities to answer research questions related to the treatment of the dead bodies and bones. On the other hand, traces of grave constructions and intervention cuts are often of exceptional-

ly high quality and some past excavators have been very good at documenting them with a high level of detail. This allows a thorough study of the diggers' practices and the effect of reopening pits on the graves' constructions.

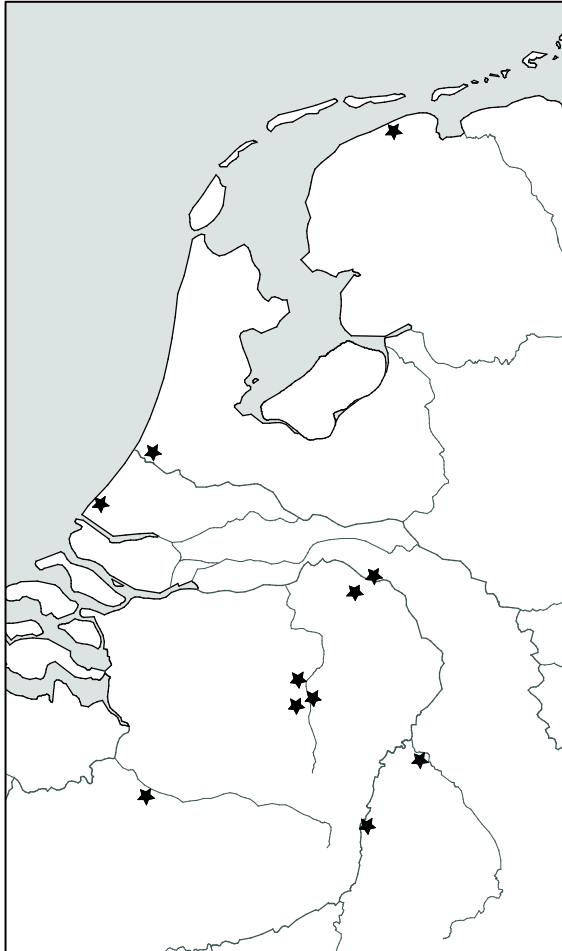


Figure 2.2 Map showing the locations of the cemeteries discussed in this study. Drawing by Frans Theuws.

The region has many more cemetery sites than were included in this study, but due to time constraints only a small number could be included. A selection was made on the basis of the quality and accessibility of the documentation. Only a relatively small number of the sites have actually been excavated and documented with the level of precision required for this project. Of those, not all are easily accessible, as many have not been analyzed and published. Where possible I worked on the basis of publications to save time, but it was often necessary to examine the original field documentation because the publications

lacked the necessary level of detail. The final result was a database containing information from eleven cemeteries excavated across the modern Netherlands and Belgian Flanders: Bergeijk, Dommelen, Meerveldhoven, Borgharen, Posterholt in the southern Netherlands; Solleveld and Oegstgeest in the western coastal Netherlands; Lent and Wijchen in the central Netherlands; Oosterbeintum in the northern Netherlands and Broechem in Belgian Flanders. In the early medieval period most of the sites were situated within the borders of the Frankish Merovingian kingdom, but the most northerly lay in the domain of the Frisian kings. Together these cemeteries yielded over 1350 graves of which at least 200 had been visibly reopened.

The variable quality of the dataset

The quality of the data from the cemeteries included in this study varies considerably. Most early medieval cemeteries in the research area were excavated over 30 to 50 years ago, when the methodology of funerary archaeology was only just starting to develop and the funding and time available for excavations was usually limited. Nevertheless, the quality of the documentation occasionally exceeds expectations to the extent that such older excavations yield more detailed information than more recent campaigns that were carried out with less care, funding or time.

The quality of the data is also influenced considerably by the local preservation conditions on particular cemetery sites, which may be more or less favorable to the preservation of bone and other organic materials and the visibility of grave construction features and traces of intervention cuts. For instance, in the sandy soils in the southern Netherlands grave construction features and reopening cuts are often exquisitely preserved as discolorations, while bone material has disintegrated, leaving little more than occasional pieces of tooth enamel and stains called 'skeletal silhouettes'. Conversely, in dark clay soils of the coastal and riverine areas, bone preservation is quite good, but traces of the grave constructions and in-

intervention pits are often difficult to distinguish.

It is clear from the above that not all sites are equally well suited for studies into particular research questions such as the treatment of the deceased's remains or the choice of different method for opening the grave. This study requires a methodology that is sensitive to these differences and offers a transparent view on the reliability of the data and the ensuing analysis. To this end the database is equipped with fields that record the quality of the available data, both on the level of the cemetery in general and on the level of the individual grave, such as the state of the skeletal material and the visibility of grave construction features. The analyses will be set up as pyramid. For relatively straightforward research questions such as the prevalence and dating of reopened graves the analysis will incorporate all or nearly all cemeteries and graves (the pyramid's base), creating a comprehensive and reliable framework for our interpretations. The analyses that require detailed high quality data will include only the top of the pyramid, the most dependable and well documented cemeteries. The conclusions drawn on the basis of this smaller dataset will not be as wide-ranging, but they will be accurate because of the high quality of the data used.

Database design, a strategy for describing reopened graves

For this project, a dedicated Access database was developed that focusses on describing and analyzing cemeteries with reopened graves. This database is available to the public and can be downloaded from the online DANS Easy archive. The basic structure of this database was inspired by the cemetery databases used in the Servatius and Anastasis projects conducted at the universities of Amsterdam and Leiden and the database used by Stephanie Zintl (2012: 116-120) for her dissertation about reopened graves in German Bavaria. For every cemetery in the study, the data from both the reopened and intact graves were put into the database. The reopened graves were described in more detail, since they are the prime re-

search subject. The intact graves and graves with an indeterminate reopening status were added solely for the purpose of comparison. Given the variable quality of the cemeteries' documentation, it was not possible to record all desired information for every grave in every cemetery, but an extensive and detailed dataset was collected nonetheless.

The database has separate forms for entering data about cemeteries and grave contexts. The Cemetery Form (frmStart > Manage cemeteries) is used to collect general information about the cemeteries used in this study. The researcher can enter the cemetery's name, an indication of the quality of the excavation and the state of publication, whether or not unexcavated graves are still *in situ*, literature references of relevant publications, the period in which the cemetery was excavated, the region in which it was found and the local soil type. These characteristics will be used to estimate and compare the reliability and representativeness of data from different cemeteries. The Cemetery Practices Field can be used to make note of mortuary practices that are not restricted to a single grave, such as feasting or the construction of buildings.

The Context Form (frmStart > select cemetery > Contexts) is used to collect detailed information about individual grave contexts. This form also has limited options to input other types of contexts like ditches, pits and stray finds that are often found on cemetery sites and may intercut graves. In this study, a context is defined as a delimited and coherent group of archaeological features resulting from past human actions. In the case of a grave the archaeological context may for instance consist of the grave pit and coffin, their respective fills, the deceased's skeleton and the grave goods. It could be debated whether a reopening pit should be considered as a separate context, but for this study it was convenient to record it as part of the grave context.

The Context Form is subdivided into tabs that focus on general information about the grave; the grave's construction with the grave pit and containers; characteristics of possible intervention pits; conclusions about the dating of post-

The screenshot shows a software window titled 'frmContextInfo' with a 'Context info' tab selected. The form contains several input fields and dropdown menus for recording archaeological data. The 'Cemetery' field is 'Broechem', 'Context number' is '8', and 'Reopened' is 'Unknown/poss'. The 'Intervention pit' tab is active, displaying fields for 'Traces of intervention pit' (Yes), 'Traces reflect extent of intervention' (Unknown/poss), 'Evidence for search trench' (No), and 'Displacement of whole planks' (No). Other tabs include 'Grave construction', 'Reopening', 'Grave goods', 'Skeletal remains', and 'Reconstructed grave goods'. A 'Remarks' box at the bottom contains the text: 'The grave shows traces of a possible reopening pit. Reopening pit outline is contained inside the coffin.'

Figure 2.3 Screenshot of the database used in this study.

depositional interventions; grave goods and other objects found in the grave's fill and any human skeletal remains that were preserved in the grave. The form behind the final tab records indications for objects that may have been taken from the reopened graves, such as fragments that were left behind.

When opening the Context Form, users first land on the Context Info Tab where they can enter general information about the nature of the context (inhumation or cremation, human or animal remains), its date, intercuts with other graves and whether it was reopened. For this last aspect, both the researcher's own opinion and that of the excavator or publication are recorded so differences of opinion are easily identified. The presumed gender association of the grave goods (male, female or neutral) is identified so it can be compared and used in addition to the deceased's osteological sex, if available. The Profile Section Drawing Field can be used to make notes on the information that is available in the rare case that a vertical section of the grave was documented. There is also a box at the bottom of the page

that can be ticked to mark exceptionally interesting and well documented reopened graves. The Grave Constructions Tab allows the user to record the characteristics of the grave pit and the types of containers placed inside it, such as a tree trunk coffin, wooden chamber or stone sarcophagus. The maximum depth, width and length of the grave pit and containers can also be recorded. If the burial had more than one container, the measurements of the largest are taken. This tab also has options for recording externally visible structures of the grave, such as poles, mounds or funerary buildings. The so called Revenant Measures Field is meant for rare additions to the grave such as stones or nails placed on the deceased's body, which are often interpreted as protective devices to prevent the dead from walking (Klevnäs 2016a: 194-197).

Under the Intervention Pit Tab the user can collect information about possible reopening cuts. The form distinguishes between different types of intervention pit traces, ranging from clear color differences in the soil that demarcate the location of the reopening cut, to vague disturbances such as the chaotic distri-

bution of the grave goods and skeletal remains. The form starts with a list of questions to determine what the intervention pit was like. Was it visible as traceable color differences in the soil; are there indications for disturbance outside the documented discoloration of the reopening pit; was there evidence for a search trench? The next set of questions helps determine when the intervention took place. Is there evidence for the displacement of whole coffin planks; did the intervention pit cut the container; was the pit backfilled after the intervention? Lastly there are a few fields that let the researcher enter information about a few typical 'ritualized' aspects that reopenings may have. Examples of these could be the use of fire in the intervention pit or the deposition of objects. The relative depth of the reopening pit is also recorded, to distinguish interventions that involve only the grave's top fill from those that go down to or even cut through the grave's bottom. In the lower half of the Intervention Pit Tab, the researcher has to decide which parts of the grave seem to have been affected by the intervention. For this purpose, the grave is divided into six sections: the head end (beyond the deceased's head), the head/neck area, the thorax and pelvis region, the legs and feet, the foot end (beyond the feet) and the sides of the grave (the parallel to the deceased's body). If no skeleton was preserved, its presumable former location should be estimated.

The Reopening Tab is meant for conclusions about the relative and absolute date of post-depositional interventions. These conclusions are based on data gathered under other tabs in the Context Form. The options under Relative Intervention Date are chosen to fit the methodology of Aspöck that was discussed above, which distinguishes four approximate archaeological timeframes for when intervention could take place (Aspöck 2005: 242, 251-252, 2011: 302-304). Time-frame A (< 1 year), when the corpse is still intact; Time-frame B (< 10 years), the corpse is skeletonizing, but still partially intact; Time-frame C (10-35 years), the corpse is skeletonized but wooden containers is still intact; and Time-frame D (>

35 years), when wooden containers have collapsed and decomposed. When the relative timing of the intervention is determined, it can be combined with the date of the grave (if available), to calculate and fill out the absolute date range in which the grave was reopened. Occasionally the absolute date can also be deduced from other factors, such as intercuts by later graves and objects that may have been left behind during the intervention.

Under the Grave Goods Tab, data is collected about the artefacts found in the grave. The format is simple and only a limited number of characteristics is taken into consideration, since a detailed study of the objects themselves is not the aim here and would be too time consuming. The finds are numbered according to the system used in the excavation documentation or publication. General object type (beaker, shield-boss, bead, sword etc.) and material (glass, iron, pottery etc.) are recorded. The Number of Objects Field allows the user to quickly enter multiple objects that have the same characteristics. The degree of completeness of fragmented objects is expressed as a percentage of the original whole. For instance, if a broken pot is missing one quarter of its fragments, it is 75% complete. The Vertical Location of an object indicates at what relative height in the grave's fill it was found (on the bottom, in the center or at the top). If the grave contained the remains of multiple individuals an object's association with a particular skeleton can be noted. If the grave was reopened, the researcher can indicate whether or not the object lay within or outside the range of the intervention. Boxes can be ticked to register whether the object shows any indications of intentional damage (judged on subjective criteria); carries potential Christian symbols such as crosses, Chi-Rho symbols or biblical scenes; has elaborate decorations like silver inlay or gems; or is an 'antique', meaning that it is significantly older than the remainder of the grave's inventory. The researcher can also make a note if other fragments of the object in question were found distributed over adjacent graves in the cemetery. Lastly, there is a box to tick if the find is

of post-early medieval date, which may help to distinguish interventions that took place after the cemetery was abandoned.

The Skeletal Remains Tab allows the researcher to collect data on multiple individuals by creating a fresh record for each one. The individuals are numbered and these numbers are automatically fed into the Associated Skeletal Remains Field in the Grave Goods Tab, so grave goods can be assigned to a particular skeleton if the grave contained more than one. Osteological sex and age can be recorded for every individual. The sex can later be compared to the gender association of the grave goods which is recorded in the Context Info Tab. The Preservation Field is used to record the state of the skeleton (well preserved, poorly preserved, only a body silhouette). The Displacement of Articulated Elements Field gives an indication of whether the corpse had fully skeletonized when body parts were moved by an intervention. If the disturbed bones are placed in a distinct patterned way (for instance, placed in a heap at the foot end of the grave), this can be indicated under Patterned Layout of Bones. Disturbance of the skeleton by additional burials can also be indicated. Lastly, if the grave contained the remains of multiple individuals the Burial Order Field records whether they were deposited simultaneously or as separate consecutive burials. In the bottom half of the Skeletal Tab, the researcher can record which parts of the skeletal remains were affected by an intervention and which are missing or fragmented. The form divides the skeleton into seven zones: head, thorax, arms, hands, pelvis, legs and feet. This part of the tab only needs to be filled out for graves where there was evidence that it had been reopened. Metal staining (usually blue from copper) on the bones can also be noted on this form, since it can be an indication of moving or removing of objects during an intervention. Lastly, the vertical location of the bones at different relative heights in the grave's fill is recorded, as is done for grave goods in the Grave Goods Tab.

The Reconstructed Grave Goods Tab is an invention of Zintl's (2012: 120) that I happily

included in my database when I read about it in her dissertation. It allows researchers to collect data on objects they think may have been taken from the grave. There are often indications that a grave originally may have contained a particular object that was removed when the grave was reopened. Such indications can be fragments of a partially removed broken object, traces of iron or copper corrosion in the soil or on bones, and incomplete sets of objects like an almost complete belt set that is missing a plate buckle, or a shield grip and rivets without a corresponding shield boss. This form is somewhat similar to that of the normal Grave Goods Tab, in that it records the type, material and number of presumed missing objects. Then there is a field where the user can estimate how certain they are that the object in question was originally present in the grave. The researcher can also check the boxes to indicate which indications for a missing reconstructed object were found and list the find numbers of the relevant fragments or objects belonging to an incomplete set.

Analysis – statistical methods

The relatively large amount of data gathered in this study lends itself well to the application of simple statistical calculations such as averages and percentages. The analysis focuses on similarities and differences between reopened graves and between reopened and intact graves. Various topics mentioned in the introductory chapter are addressed, such as the relation between reopening prevalence and the deceased's gender/sex, grave dimensions, and grave construction. A comparison of the contents of intact and reopened graves can hopefully shed light on what was taken and left behind during reopenings. The exact analyses done will be explained in detail in the next chapter, as it would be impractical to do that here without the context of the data. The data are analyzed per cemetery, to avoid unjustified comparisons between graves from different soil types or cultural areas. Only after each cemetery has been studied will they be contrasted to others.

In addition to calculating averages and percentages, I very much want to use significance testing on the results. In archaeobiology specializations such as osteology, paleobotany and zooarchaeology the use of statistics, including significance testing, is standard practice. In the more socially oriented archaeological disciplines on the other hand, statistical methods are often not even taught to students and significance testing is almost never done. This difference in practice may partially result from the types of data that researchers in these respective disciplines usually work with. Archaeobiology studies often deal with standardized datasets consisting of large amounts of numerical data that easily lend themselves to statistical analysis, while the datasets gathered by more socially oriented archaeological projects are often smaller, non-numerical and more anecdotal in nature. However, the difference between these fields also seems to be due to a difference in academic culture and research practice. Archaeologists working on social topics who do not have a scientific background are often wary of statistics. When talking to colleagues about my intentions to apply statistical analysis in my research, the responses frequently varied from neutrally asking 'How will that benefit your research?' to negative responses like 'You cannot reduce everything to numbers.' and 'If it is not significant, that does not mean it is not meaningful!'. A number of colleagues from the archaeobiology department on the other hand responded positively to my intentions and were very supportive in helping me set my first uncertain steps into statistics territory.

My reason for wanting to use statistics is that in my opinion it is a useful tool for dealing with large amounts of data. I could have looked at each of my reopened graves as a piece of anecdotal evidence, but it seemed much more promising to look for the larger hidden patterns instead. Significance testing was a logical addition, as it is a way to assess whether the findings could have come about by chance. Significance means that a finding or result would come about by chance in only 5% or less of all possible scenarios, written as

$P = \leq 0.05$. In other words, it is very unlikely this situation would occur naturally, similar to a coin falling on heads 40 out of 50 times.

The lower the probability value (P), the higher the chance that this result is not random. If a finding is significant that means it is probably not a result of chance and could therefore reflect real past cultural practices and behavioral choices. If on the other hand, a finding is not significant, there is a higher probability that it results from a random variation and not may not be culturally meaningful at all. The emphasis here is on 'may'. A non-significant finding could still have resulted from a meaningful practice, but since it is not significant, there is a higher probability that it came about by chance. The line between significant and non-significant is a fine one and somewhat arbitrary, so researchers still have to use their own good judgment. Statistical calculations become more reliable when the dataset is larger and the P value is lower. In some scientific disciplines, it is customary to set the bar at 1% of all possible scenarios or $P = \leq 0.01$ for a more stringent definition of significance (Slotboom 2008: 234-235). Statistics, including significance testing are just a way to make our research more accountable and less sensitive to personal bias. It turned out that many of the patterns in this study were indeed significant, indicating that they were probably not a result of chance and therefore likely reflect real aspects of early medieval culture. I hope my experience will encourage other researchers working on social topics to try statistical analysis and significance testing with their data.

There is a learning curve for people were never taught statistical methods during their education, but it can be a real asset to your research. The specific types of significance testing used in this study are the t-test and the Z-test. The t-test is a common test for comparing the averages of two sets of data and determining whether they are significantly different from each other (Slotboom 2008: 269). The Z-test was used when the significance of a difference between proportions or percentages had to be assessed. These tests were done to compare reopened and intact graves, men's and wom-

en's graves and so forth. Brian Wong from the Investabish Interactive Learning Centre in Amstelveen assisted me in performing these significance tests. After my cooperation with Investabish, I decided I wanted to do one more test to see if the differences in grave size between reopened and intact graves were statistically significant. For this purpose I was advised by colleagues from the bioarchaeology department to use the ANOVA, which is short for analysis of variance. It is somewhat comparable to a t-test, but is designed for the analysis of datasets consisting of more than two groups

(Slotboom 2008: 279-281). This enabled me to test graves containing male, female and neutral grave goods or graves that are intact, reopened or have an unknown status in a single analysis. The ANOVA was combined with a post-hoc Tukey test, which compares all possible pairs of means in the dataset to see which categories in the dataset were significantly different from one another and which were not ([wikipedia.org/wiki/ Tukey%27s_range_test](https://en.wikipedia.org/wiki/Tukey%27s_range_test) consulted on 09-07-2016).